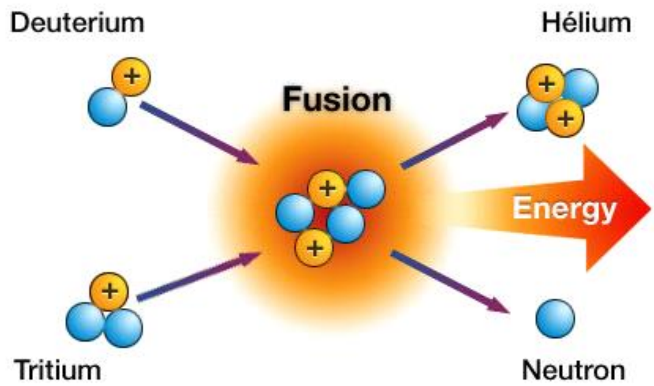
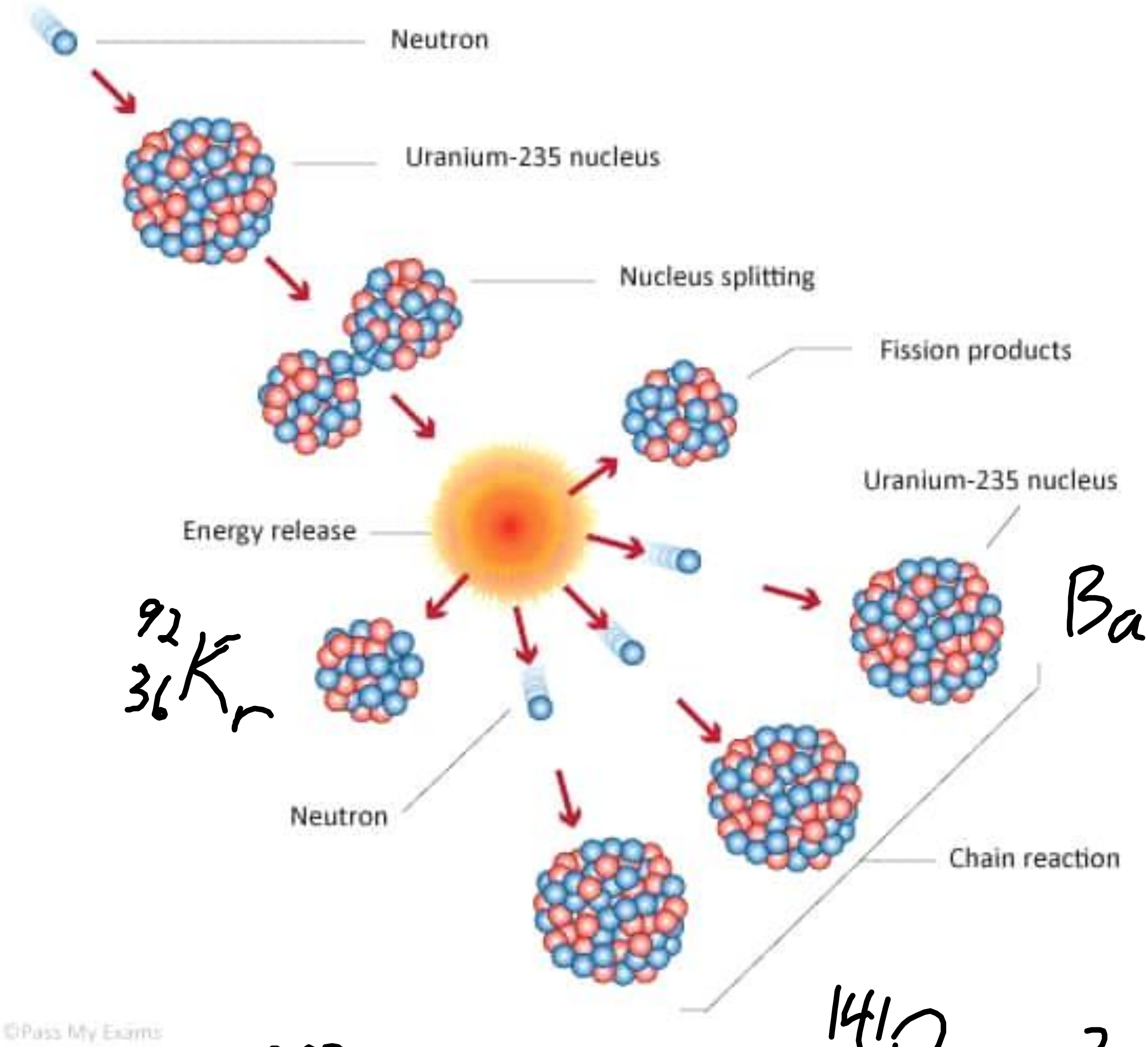
Fusion - Small nuclei combine giving off energy - energy in the sun/stars.



Positive charges repel each other, so it has to be at very high temperatures for the nuclei to get close enough for the nuclear strong force to hold them together.
Engineering problems: how to harness the gamma radiation and neutrons efficiently while containing the high energy plasma.

Fission- When a large nucleus - like uranium 235 or plutonium 239 or thorium - breaks apart giving off energy and neutrons



$$^{1}_{0}n + ^{235}_{92}U \rightarrow ^{92}_{36}Kr + ^{141}_{56}Ba + 3\,^{1}_{0}n$$

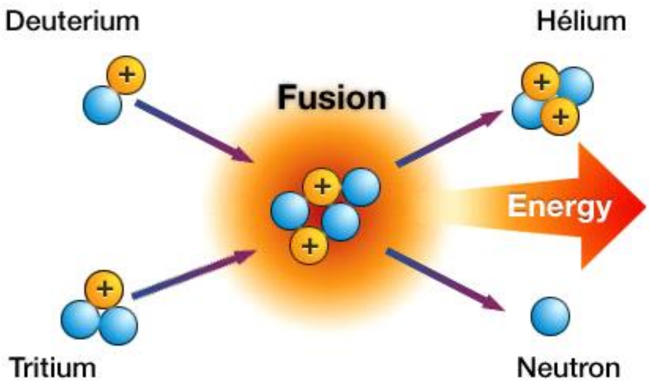
↑ hit other ^{235}U for a chain reaction

chain reaction - where the products cause more reactions, the neutrons can cause more fission.

critical mass - the minimum mass of fissionable material in a volume required for a chain reaction.
control rods - in a nuclear power plant, they absorb the neutrons to control the rate of reaction.
moderator - in a nuclear power plant, the moderator slows the neutrons increasing the rate of reaction(weird). If the neutrons move slower, they have a better chance of reacting.
Radioactive waste: the products of fission are highly radioactive over a long period of time - disposal problem
Breeders reactors: neutrons hit uranium 238 and change it into plutonium 239 - easy to separate to get weapons grade materials.

p652 Q9,10 - helium m=4.002603u
deuterium m = 2.0140u
tritium m= 3.0160492u n=1.008665u
p654 Q 2, 5, 15, 21, 23
p263 Q 9, 14, 20, 22

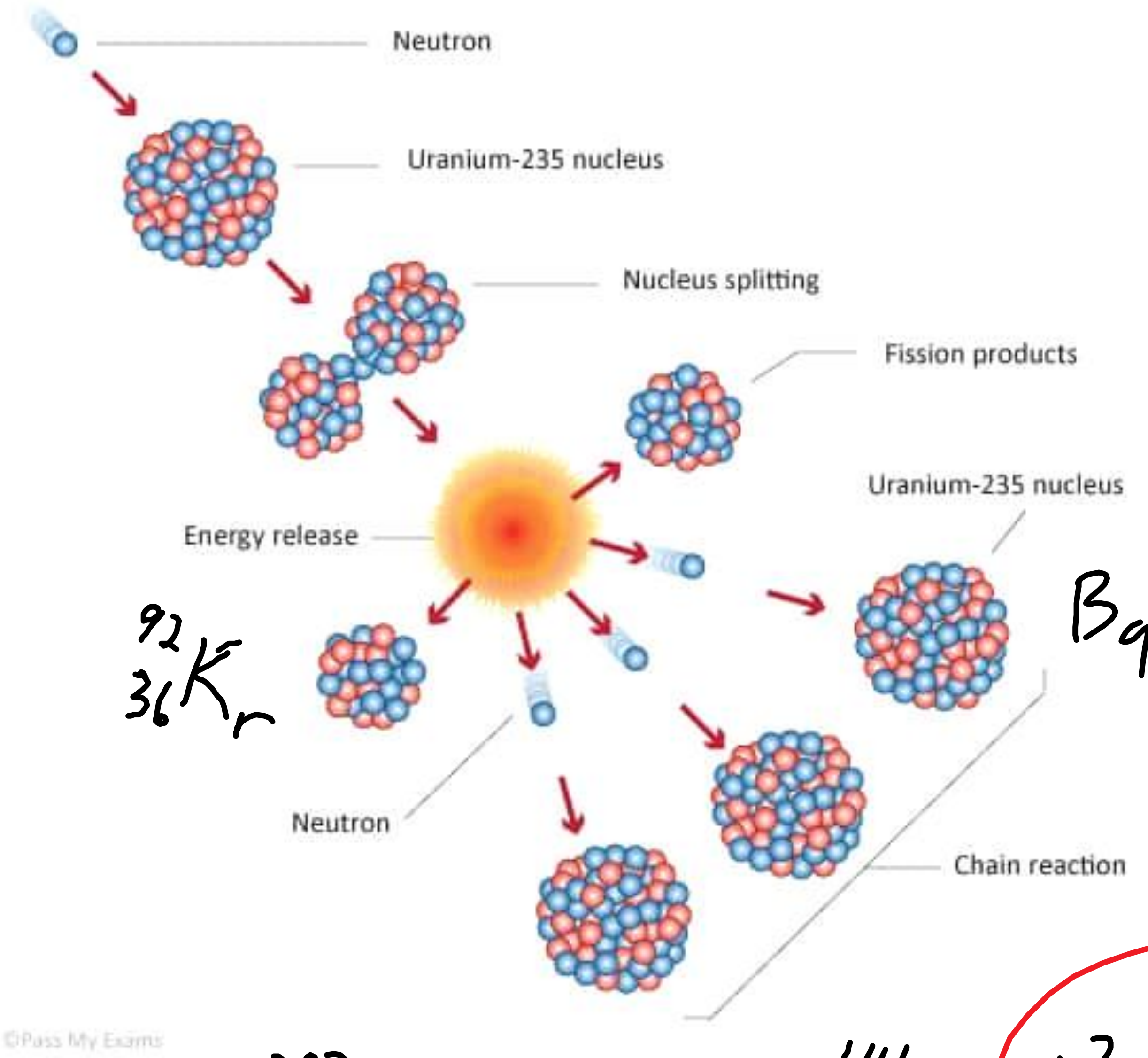
Fusion - Small nuclei combine giving off energy - energy in the sun/stars.



Positive charges repel each other, so it has to be at very high temperatures for the nuclei to get close enough for the nuclear strong force to hold them together.

Engineering problems: how to harness the gamma radiation and neutrons efficiently while containing the high energy plasma (6000º)

Fission- When a large nucleus - like uranium 235 or plutonium 239 or thorium - breaks apart giving off energy and neutrons



$$^{1}_{0}n + {}^{235}_{92}U \rightarrow {}^{92}_{36}Kr + {}^{141}_{56}Ba + 3\,{}^{1}_{0}n$$

hit other ${}^{235}U$ for a

https://www.youtube.com/watch?v=PjeIYdbK6Z4

https://www.youtube.com/watch?v=PjeIYdbK6Z4 …U for a chain reaction

chain reaction - where the products cause more reactions, eg. the neutrons can cause more fission.
critical mass - the minimum mass of fissionable material in a volume required for a chain reaction.
control rods - in a nuclear power plant, they absorb the neutrons to control the rate of reaction - cadmium.
moderator - in a nuclear power plant, the moderator slows the neutrons **increasing** the rate of reaction(weird). If the neutrons move slower, they have a better chance of reacting.
radioactive waste: the products of fission are highly radioactive over a long period of time - disposal problem
breeders reactors: neutrons hit uranium 238 and change it into plutonium 239 - easy to separate to get weapons grade materials.

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p263 Q 9, 14, 20, 22
nice